

THE FACE OF THE PACIFIC

By KLAUS MEHNERT

While lecturing on the history of the Pacific in the University of Hawaii, the author became interested in the evolution of the Pacific map. The history of the Pacific map is the quintessence of the history of the Pacific, for it visually records the countless voyages of exploration, conquest, commerce, and religious zeal on this ocean. Although it is fascinating to watch the gradual emerging of the Pacific's features from complete obscurity in a dramatic, three-centuries-long struggle between imagination and facts, no book exists as yet on this subject.

The author visited a number of leading libraries possessing old maps and, with the aid of the University of Hawaii authorities, the University of California, the Library of Congress, the Library of Pomona College, and various individual historians, collected reproductions of more than five hundred of the most important maps in Pacific history up to 1800, as well as literature about them. Students participating in his seminars at the University of Hawaii, among them some of Chinese and Japanese parentage, assisted him in this research.

Owing to the war, the work was interrupted and part of the collected material lost. But at a time when people have become engrossed in the Pacific as never before and when millions of people every day follow the course of the war on the Pacific map, an outline of the history of this map may be of interest.

DAWN

MARTIN Waldseemüller's map made in 1507 may be regarded as the first map of the Pacific Ocean. It is the first to represent the Pacific as an ocean in its own right. The maps of the world produced by European cartographers before 1507 did not contain a Pacific Ocean for the simple reason that they did not know of America as a continent and hence made the Atlantic reach from Spain to Asia.

One of the most famous representations of the world previous to 1507 is the globe of Martin Behaim, completed in 1492, before the news of Columbus's return from his first voyage became known (FIG. 16). This globe contains the sum of Europe's geographical knowledge on the eve of the discovery of America. But even after this discovery, Columbus's idea, which he maintained up to his death, namely, that sailing westward he had reached, not a new continent, but the eastern coast of Asia, continued to exist for a while. The map of the world drawn by Juan de la Cosa, one of Columbus's companions, in 1500; the map of 1503 known as the map of Bartolomeo Columbus; and Contarini's map of 1506 all cling to this idea. Hence we are hardly according Waldseemüller too great an honor if we regard his work as the beginning of the real cartographic history of the Pacific.

Martin Waldseemüller was born about 1470 in the German town of Radolfzell on an arm of Lake Constance. He grew up in Freiburg and studied at the university there. Later he joined the group of scholars in St. Dié under the patronage of the Duke of Lorraine and became the outstanding geographer and mapmaker of his day. He died about 1518. In spite of his remarkable achievements, Waldseemüller would only be remembered by experts today were it not for his map of 1507, a huge wall map totaling 36 square feet. It is famous for the facts, first, that it is the first wall map of this type; secondly, that it contains all important discoveries of the preceding decades; and chiefly that it is the first map to apply the word "America" to the New World. For us, however, this map is of particular interest because it contains in the center of the upper part two world hemispheres—to our knowledge, the first of their kind—the right-hand one of which is reproduced in our FIG. 1.

Of course, there are many mistakes in this map. It suffers from the usual underestimation of the width of the Pacific; it shows Japan near America instead of near Asia; the picture it gives of Indonesia is still very inadequate; the coast of East Asia leaves much to be desired; Australia is missing altogether; and the west coast of America is drawn in straight lines. But,

compared to all cartographic products before 1507 and to many of the ensuing decades, this map by the German master is surprisingly accurate. The fundamental fact which opened up the path to a complete recognition of the cartographic picture of the Pacific is to be found on his map.



FIG. 1—The first map of the Pacific, Martin Waldseemüller's hemisphere. It forms part of his large wall map of the world (1507). The angles have been added by us.

(To make our illustrations as clear as possible we have greatly simplified them, reproducing only those features of the maps which are of interest in connection with our article. We have translated the inscriptions into English unless the terms used are still familiar today, e.g., "Cathay" for China, "Zipangu" for Japan.)

America is shown as an independent continent consisting of two large parts connected by a narrow isthmus, a continent which possesses a land bridge neither to Europe nor Asia. The fact that Waldseemüller with his bold straight lines gives a so amazingly accurate outline of the American west coast is all the more surprising as, to science's knowledge, no European eye had yet seen a single bit of this coast in 1507. The only trouble with Waldseemüller, whom we shall have to mention many more times in these pages, is his unwieldy name (unwieldy only to the non-German, for in German his name is easy enough, meaning Forest Lake Miller). But would our readers prefer the scientific name which he adopted and which is a Greek translation of his name—Hylacomylus?

The attempt has been made to interpret Waldseemüller's straight lines of the west coast of Central and North America as an indication that even to him America was a part of Asia and that he merely refrained from drawing the details of the connection

between the two. What Waldseemüller actually thought, nobody knows; however, a glance at FIG. 1 makes it hard to follow this theory. After all, Waldseemüller drew the east coast of Asia up to 70° northern latitude not in straight lines but with various details, mainly from Behaim, which shows that he took it to be the actual coast. Any land connection between America and Asia could thus only be presumed north of 70°. We must add here that the history of geography and particularly of cartography is a most controversial matter and, in order not to overburden this article with learned quotations, we shall henceforth not enter into any of these controversies.

Martin Waldseemüller was a great scholar, who studied many ancient and new sources before he produced his map. He was familiar with the works of Ptolemy of Alexandria, with the travels of Marco Polo and Columbus, and he took some very important ideas from a letter of Amerigo Vespucci dealing with the latter's voyages along the eastern coasts of America in the years 1497/1502. Considering the rate at which news traveled in those days, Waldseemüller worked with astonishing speed: Amerigo wrote this particular letter in the spring of 1503 to Florence; from there it reached Alsace after a detour via Paris; and from Alsace it was sent on to Waldseemüller by a young German scholar. By 1507 the map was published.

But scientific news did not always travel so quickly, and not all cartographers were as eager to incorporate the latest discoveries. Moreover, geographical knowledge was guarded as suspiciously by the governments as military inventions are nowadays. Hence only some of the cartographers were influenced by Waldseemüller, while many others continued to drag along old conceptions for a long time. Indeed, there was even retrogression to be found. But ideas live on. Waldseemüller's map of the world—which had probably been inspired by an unusual combination of hard scientific work and an almost visionary intuition—was an accomplished fact.

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If we wished to follow every phase in the evolution of the map of the Pacific, we would have to look at each bay of the coasts and each little island separately. In this article, however, we shall only deal with a few of the outstanding problems.

HOW WIDE IS THE PACIFIC?

The overestimation of the extent of Eurasia from the western coast of Spain to the eastern coast of China on the part of medieval cosmographers contributed toward the fact that the width of the ocean to be crossed in a westerly direction to reach China was vastly underestimated. The Florentine geographer Toscanelli, by whose writings Columbus was influenced, calculated the distance from Gibraltar westward to the coast of China to be 130 degrees, while in reality it is 233 degrees. This miscalculation helped Columbus to decide upon his voyage; and when he found land he took it for granted that it was Eastern Asiatic soil.

Although Waldseemüller recognized the separate nature of the newly discovered land, he still clung to the overestimation of the extent of Eurasia which automatically entailed an underestimation of the Pacific. His two world hemispheres of 1507 prove that he assumed the distance from Gibraltar westward to the southeastern coast of Asia to be 155 degrees. Although this was 25 degrees nearer the truth than Toscanelli's calculation, it was still 78 degrees off. As Waldseemüller calculated the width of the Atlantic between West Africa and Central America fairly accurately at 75 degrees, his entire miscalculation is projected into the width of the Pacific, which he represented to be 80 degrees instead of 165 degrees slightly north of the equator.

ACTUAL	165°
WALDSEEMÜLLER 1507	80°
RUYSCH 1508	50°
GLAREANUS 1510	70°
VESPUCCI 1523	60°
THORNE 1527	120°
RIBERO 1529	140°
BLAEU 1606	150°

The width of the Pacific at approximately the tenth northern parallel, as it was represented by some mapmakers and as it is in reality

Our chart shows how the calculation of the width of the Pacific has changed since Waldseemüller. At first the width assumed by him was even reduced. It was only the crossing of the Pacific by Magellan in 1520/21 which created an entirely new situation. It was some time, however, before this new situation found its expression in cartography. It must be inserted here in explanation that it is much easier to determine the latitude at which one finds oneself than the longitude.

For the accurate determination of the latter, reliable clocks are needed such as were not yet in existence in the sixteenth and seventeenth centuries. This explains why the maps of those days usually contain far more errors in longitude than in latitude.

It is all the more to be admired that Ribero's map of 1529 already assumes a width of 140 degrees. Of course, the following century saw many a throwback as, for instance, Belga's map of 1603, which returned to a width of 95 degrees. But on Blaeu's map of 1606 the width was already increased to 150 degrees. Complete accuracy was only obtained during the nineteenth century.

THE NAME OF THE PACIFIC

The name which the mapmakers first gave to this ocean depended on the side from which their thoughts approached the Pacific. If they looked eastward from

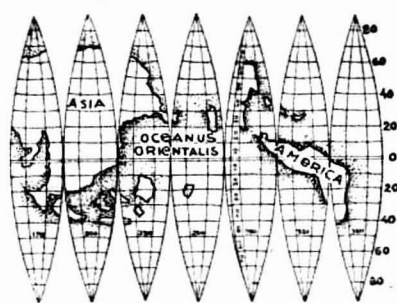


FIG. 2—Martin Waldseemüller's globe gores of 1507 (or 1509). We have reproduced only seven of the twelve gores of 30° each which make up the entire globe. In this as well as in other illustrations the longitudinal degrees shown are those of Waldseemüller, not of our time

Europe across Asia, the natural thing for them was to call it the "Eastern Ocean," i.e., in Latin, *Oceanus Orientalis* (or *Orientalis Oceanus* or *Mare Orientale*). This is the term used on the globe gores of 1507 (or 1509) also attributed to Waldseemüller (Fig. 2), as well as nos. 10 and 23. (The numbers refer to the list of maps at the end of this article.)

If, on the other hand, the mapmaker was looking westward, he was inclined to call the ocean the "Western Ocean," *Oceanus Occidentalis*. The number of those who followed this practice is small, as to most mapmakers the Atlantic was the Western Ocean. Nos. 8 and 28 give the name *Oceanus*

Occidentalis to the eastern Pacific and *Oceanus Orientalis* to the western Pacific.

A third group was looking from Europe—so to speak—southeastward. It considered the waters which washed the “Indies”—as all of south and southeastern Asia was frequently called at that time—as the Indian Ocean, which it divided into two parts: a southern Indian Ocean corresponding to the Indian Ocean of today (between Africa and Malaya) and an eastern Indian Ocean, *Oceanus Indicus Orientalis*, corresponding to our Pacific. This latter term is to be found on Nos. 6, 9, 34, 49, while No. 14 gives the name *Oceanus Orientalis* to the northern Pacific and *Oceanus Indicus Orientalis* to the southern Pacific.

A new note entered into the name-giving contest when Balboa crossed the Isthmus of Panama. On September 25, 1513, he beheld the Pacific from its eastern shore, the first European to do so. (Marco Polo had seen it from the Asiatic side.) This happened at a place where the isthmus runs from east to west. To cross it, Balboa had to march southward, and when he first saw the ocean it lay toward the south. So he called it *la mar del Sur* (the Southern Ocean). This term or its equivalents (*Mare Australe*, *Oceanus Meridionalis*) found entry in many outstanding maps and globes such as Nos. 18, 22, 46, 54, 55, and 79.

The name by which we know the ocean today was given it most fittingly by its first conqueror, Ferdinand Magellan, and it has survived because it is so much more expressive than those other purely geographical terms. When on November 28, 1520, after terrible storms and hardships in the strait which bears his name, Magellan sailed out onto its broad, majestic waves, he called it *El Mar Pacifico*, the Peaceful Ocean. (Incidentally, Magellan had a knack for suggesting geographical names which stuck. One need only remember his *Tierra del Fuego*.) We find the new name for the first time on the map which his companion, Pigafetta, made upon his return from the voyage. It was some time, however, before the name caught on. Balboa's term had a head start and was at first far more widely used. But on the Münster map (1540) we find *Mare pacificum*, after Finæus (1531) had called it *MARE MAGELLANICUM*.

For a long time both terms, Southern Ocean and Pacific Ocean, were used only for sections of the Pacific and not for the

ocean as a whole. The point is this: people were not yet thinking in terms of the Pacific as a single ocean. In a way, this also meant a retrogression after Waldseemüller. While his hemisphere showed the entire ocean, even though far too narrow, later world maps rarely presented the Pacific as a whole, because they usually had America and part of the eastern Pacific at the western end of the map and the Orient as well as part of the western Pacific at its eastern end.



FIG. 3—Abraham Ortelius's map of the Pacific of 1589

In this respect, the Ortelius map of 1589 (FIG. 3) opens a new period in the history of Pacific mapmaking, for this is, as far as we know, the first map dedicated to the Pacific as such. The English translation of its title is “Latest Description of the Pacific Ocean, commonly called the South Sea, with the neighboring regions and the islands scattered in various places on it.” It carries the words *MARE PACIFICUM*, *QUOD VULGO NOMINANT MAR DEL ZUR* all across the entire ocean, clearly indicating that this term is meant not for a part but for the whole ocean. In his map of 1570, Ortelius still used the terms *MAR DEL ZUR* and *EL MAR PACIFICO* for two different portions of the ocean, but his map of 1589, following No. 73, gives definite preference to the word Pacific. Owing to the great influence which this map exercised, Magellan's term now became firmly established. However, there were still a number of throwbacks to be found after 1589, and to some extent the term South Seas has survived to this day, although more as a poetic than as a geographic expression.

ONE AMERICA OR TWO?

With regard to the shape of Central America we find a contradiction in Wald-

Waldseemüller's work of 1507. On his large world map he shows a narrow passage between North and South America, while on the hemisphere (FIG. 1) these are linked by a land bridge. We have not seen the original of the map for, of a thousand copies printed, only one has survived and is now kept in the Wolfegg Castle in Württemberg, Germany. But on the many reproductions of the hemisphere copied by other map-makers the isthmus linking North and South America, at the spot which we now call Central America, can be seen clearly.

Both of Waldseemüller's conceptions have found their followers. One school adopted his strait theory as shown on his large world map. (Nos. 6, 8, 10, 11, 13, 30, 32, 40.) It was only after 1542 that no more important maps were drawn in this fashion. The land-bridge character of Central America had by then been established beyond doubt by half a century of exploration. The other school followed the land-bridge theory which we found on his hemisphere. (Nos. 7, 9, 23, 27.)

Although Waldseemüller drew his west coast of Central America before any European eye had seen it, he came remarkably close to the truth. It runs toward the northwest, at first at an angle of 32° , then at an angle of 69° to the equator. In reality the two angles are 28° and 58° . But among those who believed in the land bridge between North and South America there soon developed a new school which, abandoning Waldseemüller's conception, drew the course of Central America's Pacific coast almost parallel to the equator, indeed, even with a tendency toward the southwest rather than the northwest. Among the maps available to us, the first to show this new theory was that of Thorne (1527), probably under the influence of ideas similar to those which led to the Schöner map of 1524, about which we shall have more to say later on. (Others were Nos. 26, 28, 36, 37, 44, and 93b.) Even so careful a mapmaker as Ribero (1529), closely followed by No. 31, has an angle of only 9° (FIG. 4).

From the middle of the sixteenth century onwards, we find an increasing number of maps which show the coast more or less correctly. This is understandable. By 1539 the entire Pacific coast of Central America, from the innermost point of the Gulf of California in the north to the coast of Colombia in the south, had been explored.



FIG. 4—The American portion of Diego Ribero's world map. In this reproduction we have left all the names contained in the original, although they are too small to be legible, in order to show how the old mapmakers worked

THE SOUTHWEST PASSAGE

Waldseemüller's hemisphere of 1507 (FIG. 1) only reaches to about 40° south. But his globe gores (FIG. 2) extend all the way to the South Pole, and on them South America ends at about 43° . Thus Waldseemüller assumed that the American land barrier did not reach the Antarctic. It was Magellan's similar conviction that prompted him to look for a southwestern passage to the Pacific, that is, a passage which would take him south and west around the American continent to the coveted Spice Islands (the Moluccas), which the Portuguese had reached in 1511.

Why did Waldseemüller and Magellan believe that there was a passage south of America? From a pamphlet printed about 1506 and called *Copia der Neuen Zeytung aus Presillg Land*, we learn that somewhere around 40° southern latitude on the east coast of South America a Portuguese ship had rounded a cape but then had been forced back owing to adverse winds. If there is anything at all in this statement, it was probably the enormous mouth of the Rio de la Plata (35° southern latitude) which the crew had seen. While it is very likely that Magellan based his plan on some such report as this, in the case of Waldseemüller it might have been just a guess or a strange

intuition. Or perhaps it was the idea that there was one great ocean around the South Pole and that—like Africa, India, and southeastern Asia—South America, too, had somewhere to come to an end. At any rate, all Waldseemüller's many followers used his conception. And even those cosmographers who did not depend on him—such as the makers of the Lenox globe and the so-called Leonardo da Vinci globe—show South America washed in the south by a wide expanse of water.

Another school of mapmakers took over Waldseemüller's conception of the southern portion of South America but added a huge south-polar continent further to the south, separated from America by a strait. We find this idea for the first time on the Schöner globe of 1515 (FIG. 17), that is, five years before Magellan actually discovered the strait. (Nos. 11 and 14 are very similar.)

In September 1522, the few survivors of the first circumnavigation of the globe returned to Europe. Pigafetta's sketch of the Strait of Magellan became known. It was now realized that the strait was about 10° to 12° further south than had been assumed, that it was very narrow, and that Magellan had named the land south of it Tierra del Fuego. Proof of the speed with which geographic news must have spread in the first decades of the sixteenth century is Schöner's globe of 1524, which already shows the strait at almost the correct latitude (FIG. 6).

While on this globe Schöner still showed Magellan's Tierra del Fuego as part of his own imaginary southern continent which was copied by many of his followers, more detailed knowledge about Tierra del Fuego was gained by Francis Drake when in the autumn of 1578 he entered the Pacific by way of the Strait of Magellan. Unlike Magellan, he was met by heavy storms. His ship was carried southward until the coast of Tierra del Fuego, which appeared as a group of islands, came to an end. "The uttermost cape or headland of all these Ilands stands neere in 56° deg., without which there is no maine or Iland to be seene to the Southwards, but that the Atlanticke Ocean and the South Sea, meete in a most large and free scope," reads the report of the voyage. Although the first complete circumnavigation of Tierra del Fuego was only accomplished in January 1616 by the Dutch navigators Schouten and Le Maire, who named the southernmost cape Cape Hoorn

after one of their ships, the idea that Tierra del Fuego was part of a southern continent was seriously impaired by Drake. The Silver Map on a medallion kept in the British Museum and cut, probably soon after 1580, in honor of Drake's voyage, shows a broad expanse of water south of Tierra del Fuego. (Recognition of Drake's discovery was also embodied in Nos. 79, 88, and 92a.)

But in general the knowledge of Drake's discovery spread very slowly. It would appear that for political reasons Queen Elizabeth had at first forbidden any account of the expedition to be published—1588 was the year of the Armada. Hence a large number of maps continued to show Tierra del Fuego as part of a southern continent. (Nos. 77, 80, 82-86, 93b, 96.)

It was only after the return of the Schouten and Le Maire expedition that the realization of Tierra del Fuego's island character became general. Since the navigators who had proved this fact were Netherlands, the Dutch mapmakers became leading in the correct representation. The Janssonius map (1621) shows Tierra del Fuego clearly as a separate island without any connection with the southern continent.

SOUTH AMERICA'S PACIFIC COAST

Thanks to the efforts of four centuries of chroniclers and historians, we now know almost every step that was made in connection with the exploration of South America's west coast, and it seems to us as if the outline of this coast should have been clear to mapmakers ever since 1537. In 1522 the Spaniards, having established themselves in Panama, began to explore the coast further south in search of Peru, the land of gold. By 1537 the Spaniards had reached a point approximately 36° southern latitude. Magellan, on the other hand, had, after entering the Pacific, cruised northward along the coast to a point somewhere between the thirtieth and fortieth parallel—if not farther—before he struck out westward; and in 1526 Guevara sailed from Spain through the Strait of Magellan to Mexico's west coast. Yet, mainly owing to the difficulty in longitude determination, it was a long time before the simple outline of the coast found its correct reproduction on maps.

Reduced to fundamentals, the Pacific coast of South America consists of three lines and two angles, as indicated in our sketch (FIG. 5). Omitting the Gulf of Pana-

ma, one might even reduce the lines to two by linking Arica and Pt. Pariña with the west coast of Mexico. As Fig. 1 shows, Waldseemüller actually used only two lines. Comparing his idea of the coast with reality, we find him remarkably accurate in two essential points. He placed the spot where the coast changes its direction, i.e., Arica, at 17° southern latitude (in reality $18\frac{1}{2}^{\circ}$), and he believed that the angle between the two lines was 116° (in reality 133°). Again we must remember that Waldseemüller drew his lines many years before any European had traveled along these coasts. His conception of this coast, including his error of underestimating its southern extension, was adopted by his many followers.

globe (1508) makes the angle 42° , Leonardo da Vinci (1519) still smaller. Thorne (1527) gave the coast the correct tilt toward the east, and Mercator (1538) made it parallel with the meridian. But the tendency toward the west remained. Even Belga (1603) still has it. It was only in the first half of the seventeenth century that it was finally eliminated.

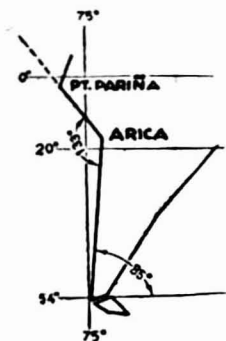


FIG. 5—Outline sketch of South America

To make Waldseemüller's coast correspond to reality, four changes were necessary:

(1) The continent had to be made to reach further south. This, as we have seen, was done by nearly all mapmakers after the result of Magellan's voyage became known.

(2) The Gulf of Panama had to be added. This could be done after it had been explored in 1513/22. Schöner (1524) already gives the general idea. The Gulf is drawn particularly well on Ribero's map of 1529 (Fig. 4).

(3) The angle at Arica had to be increased. For quite some time after Waldseemüller, the mapmakers did too much of a good thing. Instead of stretching the angle from 116° to 133° , they practically drew a straight line for the entire west coast. On No. 12 the angle is 154° , and No. 20 shows an angle of 180° , in other words a straight line. Not until the last quarter of the sixteenth century and particularly in the first half of the seventeenth century was the angle given its correct size.

(4) Actually the long straight stretch of the Pacific coast of South America between Arica and the Strait of Magellan runs almost, but not quite, parallel to the meridian. It tilts very slightly to the east, forming an angle of about 85° with the equator. Waldseemüller's coast tilted in the opposite direction. For some reason the great majority of the early maps exaggerated Waldseemüller's small error by letting the coast tilt heavily toward the west, greatly decreasing its angle with the equator. The Lenox

globe (1508) makes the angle 42° , Leonardo da Vinci (1519) still smaller. Thorne (1527) gave the coast the correct tilt toward the east, and Mercator (1538) made it parallel with the meridian. But the tendency toward the west remained. Even Belga (1603) still has it. It was only in the first half of the seventeenth century that it was finally eliminated.

During the sixteenth century a peculiar development took place in the drawing of this coast: southern Chile developed an ugly boil, which grew to large dimensions before it disappeared again. The reason for this is easy to see. The west coast of South America was charted not in one piece but mainly from the north and partly from the south. Owing to the difficulties in determining longitudes, the two lines did not quite fit together (the Strait of Magellan had been placed too far east), just as if, in building a tunnel at the same time from two sides, the directions were not properly observed. To make up for the discrepancy, the boil developed. Perhaps it was also purposely cultivated by the Spaniards to fool any other people who might wish to reach Peru. Its first indications are to be found on the maps of Thorne (1527) and Tramezini (1554). It grew to full size in Ruscelli (1561) and survived through the maps of Mercator (1569), Ortelius (1570, Fig. 19) and many others. (Nos. 68, 74, 77, 80, 96.) A similar boil, but at a point further south and directly above the Strait of Magellan, is to be found in another group of maps. (Nos. 88, 92a.) A relatively accurate early presentation of the general outline of the coast is given by Santa Cruz (1542), followed by Nos. 81, 94, 102, and 105.

NORTH TO THE ORIENT

One of the most intriguing mysteries of the Pacific map was that of the northern passages. To understand the intensity with which this question was fought over by geographers, one must remember that the aim of Columbus and his followers had been to reach the treasures of the Orient, described by Marco Polo in such glowing colors. As soon as it was realized that Columbus had hit on something that nobody had expected, the first question was how to get around this obstacle. The Portuguese

had discovered the southeastern passage to the Pacific around Africa and India; Magellan the southwestern passage around South America. Why should there not be northern passages, a northeastern one around the north of Europe and Asia, and a northwestern one around the north of America? The desire to find northern passages was particularly strong among the English and French, for whom they would be closer to home than the southern passages already discovered and in use by the Portuguese and the Spaniards. Today we know that these northern passages actually exist, at least from the geographical point of view, but that, owing to their extreme northern location, they could have been of no practical importance for the sixteenth to nineteenth centuries. Yet the desire to reach the east by way of the north was so strong that the search for these passages never ceased. This search and the hopes behind it are clearly reflected in the maps of those times.

Waldseemüller assumed both a northeastern and a northwestern passage, as can be seen from his gores of 1507 (Fig. 2). His Asia ends at 62° to 70° northern latitude, his America at 57° . (Actually the northernmost point of the Asiatic continent is $77\frac{1}{2}^{\circ}$ and of the American continent 72° northern latitude.) His many followers accepted his example in this as in so many other respects.

The cartographic fate of the *northeast* passage can be told briefly, although the belief in its existence goes far back into antiquity when the inhabited world was thought to be an island surrounded by an ocean. Had not the wise Strabo, Emperor Augustus's contemporary, taught that in all directions where men had penetrated to the limits of the earth they had met the ocean? After Waldseemüller, almost all mapmakers drew northeast passages; among the exceptions were Schöner (1515), as well as Nos. 27, 32, 34, who extended one part or another of northern Russia or Siberia to the North Pole. They may have been influenced by Ptolemy, who did not show a northeastern passage on his map (Fig. 14). Others drew northeastern passages, but put them so far north that any attempt to navigate them must have seemed rather hopeless. One such map is that of Vespucci (1523), whose Asiatic continent reaches north beyond 80° .

The almost unanimous belief in the existence of a northeastern passage is rather strange if we consider that actually the northern shores of Asia were only explored

during the years 1734 to 1823 and that for 326 years all attempts to travel from Europe to the Orient by the northern sea route around Asia came to nought until Norden-skjöld finally accomplished the feat in the years 1878/79.

AMERASIA

Far more intricate and interesting is the cartographic history of the *northwest* passage. But before we turn to its various champions we must deal with a group of maps which belong to what we shall call the Amerasian school.

It all started with the Schöner globe of 1524. (We cannot enter here into the discussion as to whether this globe was actually made by Schöner or not. At any rate, it represents Schöner's ideas on the subject.) Johannes Schöner, 1477-1547, was Professor of Mathematics at Nuremberg, an outstanding globemaker and astronomer and one of the leading scientists of his time. His first globe, 1515, followed Waldseemüller with regard to the northern end of America. In the accompanying text he expressly stated that America was surrounded by water. But in 1524 Schöner produced a globe of a totally different conception (Fig. 6). What made him link southeastern Asia and Central America by land and thereby represent South America as an extension of Asia? This idea seems very strange to us today—

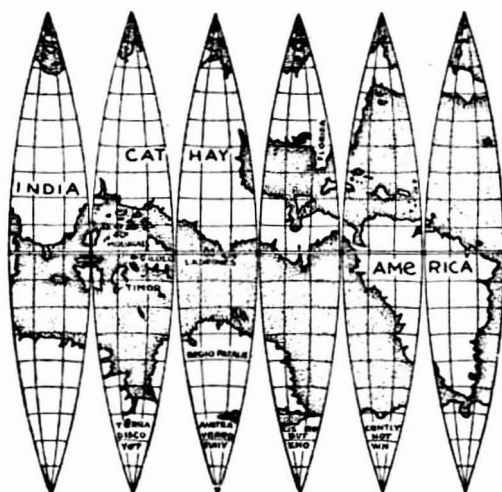


FIG. 6—Six globe gores of 30° each from Johannes Schöner's globe of 1524. They show Schöner's "Amerasian" conception. South America is linked via Central America with southeastern Asia, and North America is an eastward extension of northern Asia. The Strait of Magellan is shown at 55° southern latitude

but not so to his contemporaries. It is quite likely that the majority of thinking people of that time who had heard anything at all about the discoveries during the years following upon 1492 had in their minds a conception far more similar to Schöner than to Waldseemüller. For this there were many reasons:

(1) The survivors of Magellan's expedition had returned with very faulty ideas in the matter of longitudes. One of their accounts stated that the Strait of Magellan was separated by 106° of longitude from the Philippines (in reality 160°). This calculation was accepted by Schöner, there being no other authorities on the subject at that time.

(2) Schöner had received false information about the geography of Mexico. It was wrong inasmuch as it placed Mexico's Pacific coast much too far west, about 80° west of the Strait of Magellan (in reality: 30°). Putting together these figures of the width of the Pacific and the location of the Mexican west coast, Schöner could not but arrive at the conclusion that the Philippines were only about 26° of longitude from the Mexican west coast (in reality: 130°) and that the Ladrões (Marianas) were just off this coast.

(3) The news about the great wealth which Cortes had found in Mexico caused Schöner and many others to assume that the Spaniards had reached the Asiatic countries praised by Marco Polo.

(4) There was no evidence of water north of the line Mexico/Philippines, as no European had as yet traveled there. Magellan had not been farther north than the fifteenth parallel northern latitude.

(5) Balboa had called the ocean South Sea, not West Sea. Did this not indicate that a belt of land connected the Isthmus of Panama with Asia?

(6) Columbus's own brother, Bartolomeo, on his sketch map of 1503, had brought South America into the immediate vicinity of Asia.

By piecing together all that he knew—and all that he could know—Schöner found Mexico

and eastern Asia in such close proximity that he believed them to be one. Everything seemed to fit into this theory—the voyages of Columbus, Vespucci, Magellan, and others, as well as the accounts of Marco Polo and Cortes. Only one thing did not tally: if Schöner's theory were correct, how could Marco Polo have sailed home from Cathay? One of Schöner's followers (No. 21) solved this question very ingeniously by drawing a canal through the land bridge between Asia and South America. But most of the mapmakers who accepted Schöner's Amerasian conception (Nos. 29, 43, 50, 55) were not worried on that score. After all, Marco Polo might have been lying. For some time Schöner's theory pushed all others into the background.

In 1542 and 1543 Spanish expeditions starting from Mexico followed the coast northward to a point about 42.30° north. They found no sign of a land bridge to Asia, but neither did they prove that there was no land bridge further north. So Gastaldo, beginning with his map of 1546, simply extended the ocean farther to the north but otherwise continued the Amerasian conception. His seam between Asia and America was now no longer on the twentieth but on the fortieth northern parallel (Fig. 7). Gastaldo's map of 1548 breaks the record in the matter of land bridges. He links America not only with Asia but—via Greenland—also with Europe. As he has no *Terra Australis*, his earth consists of one continent only (Fig. 8). In the Gastaldo version, Schöner's Amerasian theory was

followed by many mapmakers. (Nos. 59, 63, 68, 84.) But finally the land bridge disappeared, disrupted by the gradual recognition of the full impact of Magellan's voyage and defeated by the continuous failure of all attempts to find the wealth of Marco Polo's China in North America.

NORTHWEST PASSAGE

It is a characteristic of most human beings that they do not like incompleteness. There is a certain *horror vacui* in man which makes him fill in gaps in his knowledge with his imagination. The geog-



FIG. 7—Jacopo Gastaldo (1546) elaborated Schöner's "Amerasian" theory by placing the seam between America and Asia farther to the north, somewhere in northern California

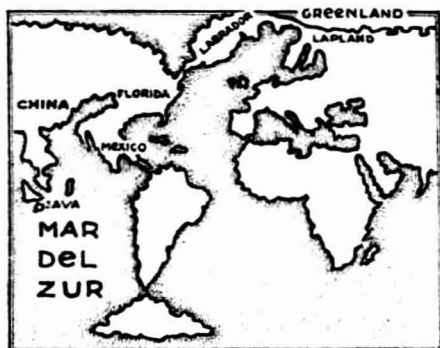


FIG. 8—In his map of 1548, Jacopo Gastaldo connected all four continents—he did not have a *Terra Australis*—by land, making the earth one great continent

raphers of Europe had absolutely no knowledge about the outline of the northern coast of North America; in fact, they could not have any knowledge of it, as the first voyages along that coast were not accomplished till the nineteenth century. Yet most mapmakers insisted on drawing it on their maps. Waldseemüller had done so too but, by drawing a straight line, he had at least indicated that he did not know anything about that coast. Others, however, took the figments of their imaginations for facts, and entered elaborate coast lines and bays on their maps (for example, Nos. 28 and 46).

These men as well as the followers of Waldseemüller showed nothing but water north of America. But they were soon overshadowed by another school which believed in a narrow strait leading between America and some arctic continent from the Atlantic to the Pacific, similar to the strait drawn on many maps between South America and the antarctic continent. This school was under the influence of the fertile brain of Mercator. He developed the two chief variations on the theme of the northwestern strait. The first (1538) was that the land north of America was a part of Asia reaching far to the east (FIG. 9). (It was followed by Nos. 37, 49, and 51.) In his second version (1569) Mercator emancipated this northern land from Asia and made it into a separate continent which he visualized as a round continent cut like a cake into four parts by four rivers. (An earlier suggestion of such conditions within the polar circle was included in Nos. 4 and 29.) This version was taken over, the size of the polar continent

varying, by Ortelius in 1570 (FIG. 19) and a long list of maps. (Nos. 70, 77, 80, 85-88, 96.)

Thus, as in the case of the northeast passage, we again find the curious fact that the majority of mapmakers believed in a northern passage although all attempts to find one by practical navigation proved nothing but an endless chain of disappointments. Ever since the continental character of America had been sensed, the pages of history were filled with the names of those who made such attempts. Some of them thought they had actually found it. There are so many islands, sounds, and bays between North America and the Pole that most voyagers returned—if they returned at all—with hopeful stories; they had *almost* reached the Pacific! Many books were written to prove that a northwest passage was possible. Sir Humphrey Gilbert, for example, used this argument: if there were a land bridge between Asia and America, the Tartars would have gone to America; since no Tartars were found in America, there could be no land bridge. A similar argument had been advanced by Sanuto in 1588: there are horses in Asia. But the Mexicans were afraid of Cortes's horses; hence America and Asia have no land connection.

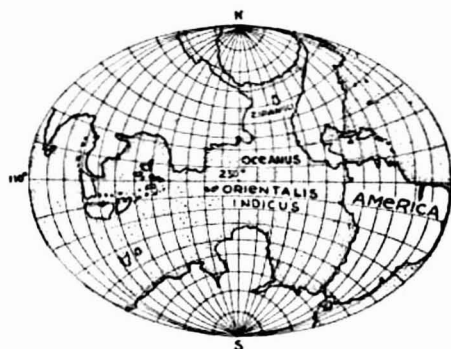


FIG. 9—Gerhard Mercator's idea of the shape of the Pacific (1538). To the north of America he shows land which he believed to be part of Asia. To make his conception clearer we have changed his complicated double heart-shaped projection into a simpler one

The optimistic phase in searching for the passage came to a close in 1632 when William James returned from his expedition with the sad conclusion that there was probably no such passage after all, and that, if there were one, it would be choked with ice and useless. The only northwest passage to have been found by the end of the eighteenth

century was overland through Canada (Alexander Mackenzie, 1793). And when in the twentieth century Amundsen (1903/05) finally succeeded in navigating north around America, this had a purely scientific and no commercial significance.

A northwest passage from the Atlantic to the Pacific presupposes not only that there is water north of America but also that there is water between America and Asia. In this respect we have so far met with two schools, that of Waldseemüller (Fig. 1) and that of Schöner-Gastaldo (Figs. 6 and 7). It was only one more step to sever the latter's land bridge completely and to replace it by a strait. This step, perhaps made already by Gastaldo himself, is to be found on the map of Zaltieri (1566, Fig. 10), which may have been copied from a lost map by Gastaldo. The Zaltieri map not only shows the strait; it even has a name for it—Strait of Anian. Much has been written about the origin of this name; most likely it was a corruption and misunderstanding of a word used by Marco Polo. For us the interesting thing is that both the strait and the name made an unusual hit with the mapmakers of an entire century. They are contained in one way or other in a large number of maps up to 1783. (Nos. 62, 64, 66, 69, 70, 72-74, 77, 80, 82, 85-88, 90, 93b-96, 98, 101, 113, 140.)

But, lest we fall into the error of believing the Strait of Anian to be an early reproduction of the Bering Strait, we must stress the fact that Zaltieri and his followers put the southern entrance of the Strait at about 40° northern latitude, while that of the Bering Strait is about 20° further to the north, and that they did not have the slightest knowledge of the long eastward extension of northeastern Asia on the one hand and the long westward extension of Alaska on the other.

The schools we have mentioned so far were gradually outdistanced by mapmakers who resisted the temptation of drawing coasts from imagination. An early representative of this group is Ribero (Fig. 4). The maps belonging to this group are not nearly as exciting as those mentioned before, and

they could not satisfy the curiosity of their contemporaries. On these maps the coasts of North America were drawn not from high-flying imagination and combination but according to facts or what their makers took for facts. (Nos. 39, 41, 42, 45, 71, 79, 92a, 93a, 97, 100, 102, 105, 108, 115, 123, 125, 127, 129.)

While in the sixteenth century the Mercator school with its imaginary coast was far ahead in popularity, in the seventeenth century this second, noncommittal group conquered the field. The many disappointments in the search for a strait had dampened the ardor of the cartographers. The first step toward the solution of the northwest passage puzzle was made by the Bering voyage in 1741 from Kamchatka to Alaska, which found its scientific reproduction on the map of the St. Petersburg Academy of Sciences (1758). This map, however, was still inclined to consider the Aleutian Islands as parts of an American peninsula protruding far to the west. The second step was made by the last Cook expedition (1776/80). But the puzzle was actually only solved in the nineteenth century in the course of explorations such as those of Parry, Beechey, Franklin, and others.

THE PACIFIC COAST OF NORTH AMERICA

Having seen how the shape of Central America emerged and how the northern mystery was treated, we now have to fill in the gap between the two. A correct reproduction of North America's Pacific coast is to be found relatively late. Well into the second half of the seventeenth century this coast is incorrectly drawn on the great majority of maps. The reason for this is simple. The tremendous expansive energy of the Spanish people had spent itself in Central and South America, the West Indies and the Philippines. Besides, there was no powerful magnet drawing the Spaniards from their bases in Mexico into North America. Early reports about the easy wealth of these areas were soon found to be completely baseless. (The discovery of California's gold riches was only made in 1848.) By the middle of the eighteenth century the Spaniards had hardly



FIG. 10—The Strait of Anian between America and Asia—which was to haunt a long list of maps—was introduced into cartography by the map of Bolognito Zaltieri in 1566

expanded northward beyond the areas occupied in the first rush of their discoveries, and they held no permanent settlements beyond the peninsula of Lower California. There was little knowledge about the course of the coast further to the north, and little interest in it. Only Drake had followed the coast to about 48° northern latitude. A decisive change in this attitude was wrought by the coming of the Russians to America in the wake of Bering's voyage. In 1769 the Spanish authorities were warned of the danger of Russian encroachments. Now the Spaniards took up the exploration and colonization of the coast in earnest. In 1776 San Francisco was founded. By 1780 the coast was known up to the sixtieth parallel, that is, as far as Alaska, whose coast was meanwhile being approached by the Russians who founded Sitka in 1799. Thus reliable maps based on facts, not on fancy, could not be expected before the end of the eighteenth century. How did the various mapmakers and their schools treat this coast up till then?

Waldseemüller (Fig. 1) admitted his ignorance of details by drawing an absolutely straight line running exactly from north to south, or parallel to the meridian. In reality the general direction of the coast from Sitka to Cape Corrientes in Mexico runs at an angle of 28° to the meridian. Most of Waldseemüller's followers stuck to his example. The entire Mercator school which we discussed in connection with the northwest passage drew its own fanciful west coast but, on the whole, also had the coast run along the meridian.

A school which drew an entirely different coast line took its inspiration from the Verrazano voyage. In 1524 Giovanni da Verrazano, in the service of the King of France, had sailed along the east coast of North America in search of a route to Asia. It seems that somewhere between 35° and 40° northern latitude he thought he saw an expanse of water on the other side of a narrow neck of land. This led a number of mapmakers to believe that at this point North America narrowed down to a thin isthmus and that the water on the other side was the Pacific. This is the conception on which Maiollo based his map of 1527 (Fig. 11). (Also Nos. 26, 28, 78.)

Far closer to the truth than any of the schools mentioned so far came the cautious group of mapmakers who only drew as much as they knew. This group starts with



FIG. 11—Vesconte de Maiollo's map of 1527 shows the Verrazano conception of North America, with its west coast turning at a sharp angle toward the northeast. South America's Pacific coast is drawn as an almost straight line. The strait running in a north-south direction through Central America was soon abandoned by mapmakers, as its nonexistence had been proved by the mariners

Ribero's map of 1529 (Fig. 4) and is followed by Nos. 31, 38, 39, 41, 42, 45, 57, 79, 92a, and 103. In this group we would also include Gastaldo for giving a rather good picture of the coast, had he not—with the possible exception of his map of 1556—spoiled his and his school's record by his adherence to the Amerasian conception.

Two mistakes crept into the maps of the cautious group. The first was the tendency to draw the west coast beyond Lower California more or less parallel to the equator. This error is found in Hondius (1630). He took it from Mercator, who had made it on his map of 1569, perhaps owing to an erroneous interpretation of the account of the Coronado expedition (1540/41) in the work of Gomara, and from Ortelius (Fig. 19). Hondius's example was followed in Nos. 105 and 113, down to 1783 in Vaugondy's map.

The second mistake pictured Lower California not as the peninsula it is but as an island. This error survived through a long list of maps. (Fig. 12 and Nos. 99-101, 108, 111, 112, 115, 116, 118, 120, 123, 124.)

Up to the end of the seventeenth century, the mapmakers of the cautious group had not dared go beyond the northern end of Lower California. In his map of 1700, Delisle carried the coast to $42\frac{1}{2}^{\circ}$ northern latitude, and in 1722 to 45° . The outlines of the complete coast, including that of Alaska, are found on the map of the St.

Petersburg Academy of Sciences (1758) and No. 137. Yet even the relatively enlightened eighteenth century produced a number of maps of this coast which were a relapse into mapmaking by fancy, examples being the map of Sanson (1705), which puts the south coast of Alaska 10° too far south and shows a northwest passage through Canada and an "eastern ocean" in what is today the northwestern corner of the USA; the maps Nos. 132, 135, and 138, which greatly embellished the "eastern ocean"; and the maps Nos. 134 and 139, all of the French school.

"TERRA AUSTRALIS"

Any geographical discussion concerning the Pacific coast of the American continent could only start after the discoveries of Columbus; but the cartographic history of the other shores of the Pacific goes far back into antiquity. Among geographical puzzles one of the most intriguing was that of the southern continent—the *Terra Australis*, a puzzle which caused cartographers as much excitement and as many headaches as the problem of the northwest passage.

The conception of a southern continent was originally based on Greek cosmographical theory. Once the Greeks had proved that the earth was a sphere and not a flat disk, they began to speculate on the existence of a continent in the southern hemisphere. Two classical geographers in particular influenced the thought of later students in this respect. Pomponius Mela (FIG. 13) represented what we might call the "wet" theory. He believed that the southern hemisphere consisted chiefly of ocean in which, surrounded by water, there was a continent; this continent had Ceylon—the Taprobane of the ancients—for its northeasternmost extremity, and at a very early stage it was called *Terra Australis* (southern land). Ptolemy on the other hand, the great geographer of Alexandria who worked about a century later, represented the "dry" theory, which supposed the southern hemisphere to consist largely of



FIG. 12—Abraham Goos (1624) shows the peninsula of Lower California as an island. This custom survived in many maps up to the eighteenth century

land. He linked southeastern Asia by land, which he called *Terra Incognita*, with the west coast of Central Africa, thus making the Indian Ocean a "mediterranean" sea (FIG. 14).

During the Middle Ages the Greek concept of the spherical shape of the earth and of a southern continent was rejected by the teachings of the Church. "There is no reason," St. Augustine wrote in his celebrated *De Civitate Dei*, "for giving credence to that fabulous hypothesis of men who walk a part of the earth opposite to our own, whose feet are in a position contrary to ours." He also emphasized that the Scriptures said nothing about antipodes and finally that there was no historical testimony as to the existence of such regions. This last statement was undoubtedly correct, as the Greeks had based their conception of a southern continent not on experience but merely on the work of their brains. Not all churchmen, however, rejected the sphericity of the earth. St. Isidore of Seville and the Irish priest Virgilius both conceded the possibility of antipodes. But while, by an irony of fate, there are today no churches in the antipodes dedicated to these two, there are some dedicated to St. Augustine, the very man who refuted their existence.

The medieval conception of the earth is shown in the round or oval maps which represented it as a disk, curious mixtures of Bible interpretations, Arab influence, and geographical features taken from the ancients. In the latter part of the Middle

Ages they became more realistic. The maps of Marino Sanuto and Petrus Vesconte in the first quarter of the fourteenth century (FIG. 15) are among the best of their time and were frequently copied and gradually improved upon. These maps follow Mela's "wet" theory, with an ocean around the inhabited world, but without his southern continent. On the other hand, Ptolemy's maps came into vogue again and were often reproduced. His *Geographia*, showing the *Terra Incognita* in the south,



FIG. 13—Pomponius Mela (middle of the first century A.D.) believed that one Oceanus surrounded the inhabited world and that there was a large continent on the southern hemisphere, the northeasternmost point of which was Taprobane (Ceylon)



FIG. 14—Claudius Ptolemy (middle of the second century A.D.) shows the world between the seventieth northern and the twentieth southern parallel. With the exception of the western side, he had his map end with land in all directions, so that the Indian Ocean appears as a landlocked sea. His India is too small, his Ceylon (Taprobane) too large. Next toward the east he had the Malay Peninsula (which he called the Golden Chersonese); then the Gulf of Siam (called *Magnus Sinus*); and finally today's French Indo-China, which he linked by land with Central Africa

became practically a best-seller and had a total of forty-eight editions all over Europe between the years 1472 and 1624. A combination of both types was the map (of uncertain date) of the codex in the Venice Library which, although a disk, showed Ptolemy's southern land bridge.

Marco Polo's account of his travels gave a new impetus to the supporters of the southern land theory. In describing the countries between China and India, Marco Polo spoke of Chamba (Cochin China) and Java the Great (Java). He then described a number of other places, giving the distances to them. While we know now that he measured the distances to these places from Chamba, he was for a long time misunderstood by his learned readers, who believed the distances to be measured from Java. This misunderstanding led to the belief that, 1,200 miles to the south of Java, there was a great and rich country called Locach (later corrupted into Beach) where brazilwood grew and gold was to be found, and still further south the island of Java the Less. This interpretation took the geographers to some fabulous countries far into the southern hemisphere, while in reality Marco was only speaking about Siam (Locach) and Sumatra (Java the Less). The

great voyages of discovery which carried the Portuguese around Africa to the Indian Ocean shattered Ptolemy's "dry" theory, proving that the Indian Ocean was not a landlocked sea and finding no trace of the southern continent. Yet the *Terra Incognita* remained on many maps, only moving further to the south.

Behaim's globe of 1492 (FIG. 16) was an effort to reconcile Ptolemy's teachings with the newly acquired knowledge. Behaim broke up the central part of the *Terra Incognita*, replacing it by some islands but still leaving its western and eastern portions which reached out from southern Africa and southeastern Asia like two arms stretched toward each other.

An entirely new development began with Schöner's globe of 1515 (FIG. 17). In dealing with the southwest passage, we have already seen how he came to draw a southern continent on it. His continent enclosed an antarctic sea like a huge, not quite closed ring with its opening south of Java, and was called by Schöner *Brasilie Regio*, the land of brazilwood. In his map of 1520 he further developed his theory with some minor changes, and on the map of 1524 (FIG. 6) he inscribed on the continent the words "the southern land recently discovered but not yet fully known." From now on the southern continent became a standard feature. With the exception of Waldseemüller and his school and some other maps (Nos. 35 and 48), most mapmakers agreed on the existence of a *Terra Australis*, differing only with regard to its size and shape. If there were no southern continent, they argued, the northern hemisphere with its vast land masses would be heavier than the southern one and the world would turn upside down. As Asia, Europe, and Africa are for the most part to the north of the equator, there must be a continent south of the equator so large that with the southern parts of Africa and America it would form a weight equal to that of the northern countries.



FIG. 15—Petrus Vesconte's disk map of 1320 is a relatively advanced example of medieval cosmography. Its most accurate part is the Mediterranean area and Arabia

From Schöner's map of 1515 onward, the southern continent grew lustily till about 1640. During this period it passed through two stages. The first was initiated by

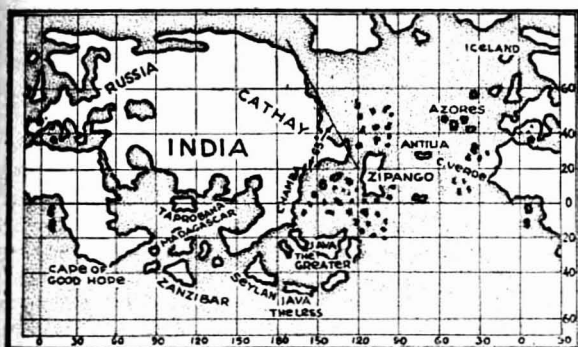


FIG. 16—Martin Behaim's famous globe of 1492 displays the conception of the most advanced Occidental cosmographers on the eve of the discovery of America. In this reproduction the globe projection has been changed to Mercator's projection, in which the meridians run parallel instead of meeting at the two poles. The angle has been added by us. The eastern and western ends overlap

Finaeus in 1531 (FIG. 18, followed by Nos. 33, 34, 43, 46, 49, 50, and 55). These maps retained Ptolemy's southern continent whose existence no one had disproved, although Da Gama had broken a hole in its southwestern and Magellan in its southeastern corner. In fact, Magellan's voyage seemed

to the south. On the maps of the Finaeus group the Pacific coast of the *Terra Australis* followed approximately the thirtieth southern parallel, but southeast of Java it had a deep gulf, where the break had been in the ring-like southern continent of Schöner (1515, FIG. 17). Of the two bulges created by the gulf, the western one was now called *Brasilie Regio* and the eastern one *Regio Patalis*. This latter name derived from the name of a town, Patala, near the mouth of the Indus, about the southeasternmost point reached by Alexander the Great. Standing as it then did at the edge of the known world, *Regio Patalis* came to mean since Pliny as much as "the furthest," thus later being applied to part of the southern continent. By now the mapmakers had convinced themselves so thoroughly



FIG. 17—This reproduction of part of Johannes Schöner's globe of 1515 shows that he drew a strait to the south of South America, although not far enough to the south, four years before Magellan discovered the strait which bears his name. Schöner's southern continent enclosed the South Pole like a wide ring of land open toward the southwestern Pacific

to have furnished additional confirmation of a *Terra Australis*, for had not Magellan seen land on his left when passing round the southern tip of America? It is also quite possible that the Portuguese, while trading in Indonesia, had heard of some large country

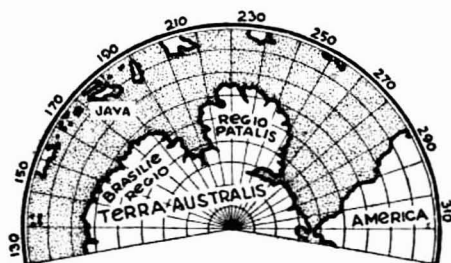


FIG. 18—On Finaeus's map of 1531 the *Terra Australis* has grown to respectable proportions. We have simplified the projection used on the original map

The originator of the second stage in the growth of the southern continent and the outstanding representative of the largest type of *Terra Australis* was Mercator, with his map of 1569. It was taken over by very many maps, among them Ortelius's of 1570 (FIG. 19) as well as Nos. 70, 74, 77, 82-88, 90, 93b, 94, 96-98, and 105.

Mercator and Ortelius (whose map we reproduce as it is more clearly drawn) depicted practically everything as *Terra Australis* which was not proved to be water; but by omitting names and details of outline they admitted that they did not know much about this continent. They left a neck of water between *Terra Australis* and New Guinea, which latter had been visited by the



FIG. 19—On the map of Abraham Ortelius of 1570 the *Terra Australis* has attained its largest size. Part of its coast facing the Pacific resembles the coasts of Australia. To South America Ortelius gave a big boil in southern Chile. Japan is at approximately the right place, but its shape is still quite wrong

Portuguese in 1526 as "Papua Island" and renamed *Nova Guinea* two decades later. On the whole, the insular theory of New Guinea prevailed, but some maps (such as Nos. 84-87) made New Guinea part of the *Terra Australis*, while Plancius (1592), to be on the safe side, showed New Guinea as an island on the western end of his world map, and part of the *Terra Australis* on the eastern end. The first to sail through the strait between Australia and New Guinea was Torres in 1606. It was during the same expedition that Quiros gave to the New Hebrides—which he had discovered and which he believed to be part of the long-looked-for southern continent—the name *Austrialia del Espiritu Santo* (Austrialia of the Holy Spirit) in honor of King Philip III of Spain, who was also Archduke of Austria. The present name of Australia, which is a combination of *Austrialia* and *Terra Australis*, was suggested by the explorer Flinders early in the nineteenth century.

If we look at the outline which Mercator and Ortelius gave to the Pacific coast of the *Terra Australis* we find it (as a comparison of Figs. 19 and 20 shows) in some ways surprisingly similar to the shape of North Australia as we know it today. No wonder that down to our days there has been much speculation as to whether mapmakers such as Schöner, Finaeus, and Mercator did not have some actual knowledge of Australia; whether, in other words, Australia was not discovered much earlier than has generally been assumed. But a closer examination reveals that in Mercator's coast line we do not find traces of Australia but only of the wrongly interpreted Marco Polo. Mercator calls the island in the gulf Java the Less (Sumatra); the peninsula west of it is labeled "Beach, Ouriferous Province" (the



FIG. 20—Outline sketch of Australia and Tasmania. The heavily drawn parts of Australia's and Tasmania's coasts were discovered by Dutch explorers between 1605 and 1644; the rest much later by the English

Locach=Siam of Marco), a term which survived down to Visscher's map (1639).

There is one small group of cartographers that does not fit into the Schöner-Finaeus-Mercator tradition. They drew a very small continent around the South Pole, only a few degrees in size. (Nos. 12, 37, 52.)

Finally, there was, prior to the actual discovery of Australia, a third group which confined itself strictly to depicting known lands, straits, etc., and refused to commit itself as to the existence of a southern continent. (Nos. 20, 25, 42, 45, 58, 68, 92a, 93a, 103, 106.) Similar to this group is that composed of maps which assumed a southern continent but sketched its outline very cautiously and only in part or in straight lines. (Nos. 21, 54, 71.)

The idea of the *Terra Australis* was not just the pastime of cosmographers and mapmakers. It also led to many expeditions which ventured forth during the sixteenth, seventeenth, and eighteenth centuries in search of that continent. Mendaña, Drake, Quiros, Le Maire, Van Diemen, Roggeveen, Bouvet, Wallis—they all set out to look for the *Terra Australis*. What they found was at first a great number of islands and, later, Australia and New Zealand too—that is, regions which differ greatly from the old conception of the *Terra Australis*.

The actual discovery of Australia took place in two phases. Between 1605 and 1644 the Dutch discovered the entire north and west coasts and the western half of the south coast (FIG. 20) of what they were later to call New Holland, as well as some parts of Tasmania and New Zealand. The

first Dutch discoveries did not essentially contradict the *Terra Australis* conception; it was not blasted until in 1642 Tasman traveled in a wide circle around "New Holland," thus proving it to be a continent and not linked to a *Terra Australis*. Among the earliest to give an idea of Australia were the cautiously drawn map of Colom (about 1642) as well as Nos. 110, 115, 117. An attempt to reconstruct the east coast was made by Callander (1766/68), just prior to Cook's voyage. But it turned out to be at fault. The correct reproduction did not come till after the second phase of Australia's discovery (1769/70), when Cook explored New Zealand and Australia's east coast, leaving only the remainder of the south coast to later explorers.

Yet the belief in the great southern continent survived even after Tasman's and Cook's voyages. "To put an end to all diversity of opinion about a matter so curious and important" as the *Terra Australis* was the main object of Cook's second voyage (1772/74). After stopping at New Zealand, Cook sailed as far south as he could. He made a complete circle around the southern hemisphere at about 55° to 65° southern latitude and thereby sailed through regions where the *Terra Australis* was formerly believed to be and where he found nothing but water, a few barren islands, and antarctic ice. Only after the results of this voyage became known did the alluring *Terra Australis* disappear for good from maps.

SOUTHEASTERN ASIA AND INDONESIA

We have seen that by the time of Behaim (Fig. 16) two arms reaching out from Africa and southeastern Asia and a number of islands were left of Ptolemy's *Terra Incognita*. We are only interested here in the arm of southeastern Asia, which resembles an elephant's trunk, and in the islands to the east and southeast of it. As to their knowledge of these islands, the cartographers depended principally on Marco Polo's words and on their own imagination. So they drew islands in any shape that suggested itself to them and labeled them with names from Marco Polo such as Java the Greater (for either Borneo or Java), Java the Less (Sumatra), Pentam (Bintang), Malaiur (Malaya), Ne-cuveran (Nicobars), Anguana (Andamans), Seilan (Ceylon). To the north they drew some of the 7,459 islands of which Marco Polo had spoken.

Behaim's conception was adopted by Waldseemüller. His gores (Fig. 2) show the same elephant's trunk and large islands. The Behaim-Waldseemüller conception was later copied with minor changes on a large number of maps. (Nos. 4-6, 8-10, 13-16, 23, 24, 27, 30, 40.)

One school branched off with the Schöner globe of 1524—the Amerasian school. With it the elephant's trunk disappeared, since southeastern Asia was linked to Central and South America. The *Mar del Zur* was believed to be identical with Ptolemy's *Magnus Sinus* (Fig. 14). Schöner drew this globe when the first results of the Portuguese voyages to Indonesia and of Magellan's voyage had become known. Thanks to Schöner's quick work, we find on his map names such as those of the Moluccas, Gilolo, Timor, Brunei (Borneo), some of the Philippine Islands, and the Ladrões (Marianas), the latter too far to the south.

Another school branched off with Thorne's map (1527); it dissolved a large part of the elephant's trunk into a number of large islands. (Nos. 37, 51, 52.)

And, of course, there was again the group of independent mapmakers who only included that for which there was some basis. To it belong Maiollo (1527), one of the first to show the Philippines; Ribero (1529), who drew Sumatra, the north coast of Java, the Malay Peninsula, and some of the Molucca and Philippine Islands; Cabot (1544), who put the Ladrões in the right place and gave many of them their correct names; Gastaldo (1561), with many details in the Banda Sea; Berteli (1565), with a large number of island names. From then on Indonesia and southeastern Asia were drawn more or less correctly. Island by island, the picture of this maze of islands was pieced together. On Mercator (1569) we find New Guinea, on Ortelius (1589) the Solomons (discovered in 1567). Particularly good is the map of Linschoten (1599), his chief error being that he put the Ladrões too far to the south.

THE PACIFIC COAST OF ASIA

Ptolemy left the question open as to what lay beyond China (Fig. 14). There was land where his map ended. Mela, on the other hand, drew an east coast for Asia which ran approximately from north to south as a prolongation of the east coast of India (Fig. 13). The medieval disk map followed his example except for adding the

Malay Peninsula—and Paradise (on the eastern rim of the earth). Behaim's coast (FIG. 16) ran due north along the shores of Chamba (Cochin China). At about 22° northern latitude, it turned east at a right angle, which is not bad (Haiphong is actually on 21°). After running eastward for about 30° longitude (in reality it is only 15°), it turns northwest.

While so far the job is quite a good one, the drawing now becomes totally wrong, and it is with the portion from here to the East Cape that we shall be concerned. Behaim's coast runs at an angle of about 65° to the equator up to 66° northern latitude and then turns west. In other words, his coast line runs from about Amoy to Turukhansk on the Lower Yenisei, and all the huge land masses to the east of this line, including large parts of North China and Siberia, are not to be found on his globe. This conception was adopted by Waldseemüller and followed by his entire school.

While Behaim and Waldseemüller had drawn the coast incorrectly in a northwestern instead of in a northeastern direction, another group came nearer to the truth by drawing the coast straight from south to north. (Nos. 16, 17, 26, 28, 34.)

The group which at a very early stage gave the coast its almost correct shape did this, curiously enough, by way of an error. The first to fall for it was Contarini (1506, FIG. 21). He extended northeastern Asia so far to the east that it reached the immediate vicinity of Scandinavia. We find his conception, although with some alteration, on a number of maps. (Nos. 4, 37, 52.)

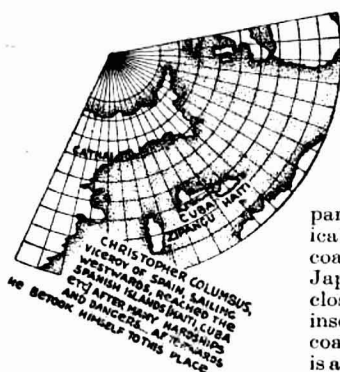


FIG. 21—Giovanni M. Contarini (1506) gave northeastern Asia an extent which brought it close to Scandinavia. Of America he showed only part of South America's northeastern coast. Cuba and Japan (Zipangu) are close together. The inscription on the coast of South China is a translation of the inscription on the

original. It shows that Contarini believed Columbus actually to have reached the Orient

As actual knowledge of the coast increased, its correct features gradually extended north-

ward on the maps of the leading geographers. Since this essay is concerned with the evolution of the Occidental map of the Pacific, we shall not deal here with cartography of purely Oriental origin. The Yellow Sea is found on Mercator (1569, and No. 64), although a little too far to the north; the peninsula of Korea on Plancius (1594 and Nos. 92a and 97), although too narrow and in a wrong direction. Many maps between 1595 and 1660 made Korea an island. (Nos. 89, 91, 93a, 112, 114.) There is a certain parallelism in the cartographic history of Korea and California. Both were generally represented correctly as peninsulas in the sixteenth and wrongly as islands in the seventeenth century. Sakhalin (Karafuto), the Sea of Okhotsk, and Kamchatka are on Halley (1700); the Manchu Empire up to the Amur River in the Jesuit Atlas (1717); the Gulf of Anadyr on Strahlenberg (1730); the Kuril Islands on Laurent (about 1750); and the northeasternmost extremity of Asia on Delisle (1731) and Kyrilov (1734).

NIPPON

Marco Polo acquainted the west with the existence of the island empire of "Zipangu," which he had not visited himself but about which he had heard that it was an island of gold and pearls, lying toward the east in the high seas, 1,500 miles distant from the continent. In his work on the cartography of Japan, Count Teleki points out that Marco Polo was right if one understands his "1,500 miles" as 1,500 Chinese *li* and counts them from Quinsai (Hangchow), where Kublai Khan's forces had gathered against Japan. (The southern end of Kyushu is almost exactly due east from Hangchow.) But whatever Marco Polo may have had in mind when he made his statement—it was misunderstood. As a rule, we do not find Japan on the medieval disk maps as they were limited in space, although Fra Mauro (1459) managed to squeeze it in, barely off the coast. Its real appearance on a western map was made by Japan on the famous map of Toscanelli (1474) and on Behaim's globe. Both had understood Marco Polo to say that one large island was located 1,500 miles east of the China coast; hence they gave this island the shape of a large rectangle running from north to south between about 5° and 28° northern latitude. For about half a century almost all map-makers followed the Toscanelli-Behaim conception in one way or another. Contarini (1506) placed the island closer to America

than to Asia. So did Waldseemüller and his school. Ruysch (1508) even merged Japan and Haiti (known as Española in those days) into one. His example was of great influence, and on many maps Japan as such disappeared in favor of Haiti. The Amerasian school went its own way again and omitted Japan, as did some mapmakers who did not belong to the Amerasian school (e.g., Nos. 22, 37), most of them being those who drew northeastern Asia and northwestern America so close together that no space was left for Japan.

A new situation arose with the voyage of Magellan, who had sailed across the Pacific without hitting anywhere upon Zipangu and who, instead, had found the island groups of the Ladrões (Marianas) and the Philippines. When, in 1542, the first Portuguese landed in Japan, the identity of the Japan which they found with the Zipangu of Marco Polo was soon realized. Cabot (1544) pushed Japan further to the north and closer to Asia (between the Ladrões and China) and gave the island a north-eastern trend instead of drawing it parallel to the meridian. Desceliers (1546) put the island still closer to the China coast but continued to give it the general outline indicated by Toscanelli. The first to give Japan approximately its right location on the map was Homem (1558). But it did not stay there, and on some maps moved again to halfway between Asia and America. (No. 86.) Mercator (1569) gave Japan both the correct location and direction but still adhered to the old idea of a single island. Ortelius on his map *Asiae Nova Descriptio* (1570), and Dourado (158?), broke up Japan into several islands in which, with some imagination, one can recognize the three main islands of Honshu, Kyushu, and Shikoku. Ortelius's special map of Japan

(1595) is remarkably correct as far as the three main islands are concerned, except for underestimating the northward extension of Honshu (Fig. 22).

The northernmost of the great Japanese islands, Hokkaido (or Yezo, as it was then called) had one of the most curious fates in cartographic history and led to a terrific confusion in the minds of the mapmakers. The first report about this island was sent to Europe by a Jesuit in 1566. Later on it was linked with baseless rumors of islands rich in gold and silver near Japan, and Ortelius (1589, Fig. 3), showed the *Isla de Plata*, the "silver island," north of Japan. (Nos. 104 and 106 left it there but called it Yezo.) Spanish and Dutch expeditions were sent out to find the wonderful islands. In the foggy north Pacific it was very difficult to follow coast lines and establish correct positions. So Yezo started out on its long wanderings. Graaf (about 1650) made it a huge piece of land and probably a part of America; Witsen (1692) part of the Asiatic mainland; Sanson (about 1705) part of an arctic continent; Strahlenberg (1730) and Bellin (1735) part of Kamchatka, and some mapmakers even put one Yezo in Asia and one in America. After these voyages all around the northern Pacific, Yezo finally returned to its more or less correct location—but not yet its correct shape—on Delisle (1731) and Kyrilov (1734). Bering's voyages cleared up the matter and also reduced some other fancies such as Gama Land, State Land, and Compagnies Land, which turned out to be small islands in the Kuril chain. The St. Petersburg Academy of Sciences map of 1758 gives what is on the whole a correct picture of the northwest Pacific.

THE PACIFIC ISLANDS

We have dealt in this article with the evolution of the main features of the Pacific map, omitting to trace the appearance of the countless islands and island groups. Most of them became known relatively late, as the early navigators happened to choose courses which allowed them to see only very few of the thousands of islands. Of those that were discovered, many did not find their way onto maps for a long time, among them the Carolines (later Marshall Islands), which had been discovered in 1526. In his *Periplus*, Nordenskjöld explains the reasons:

That such islands, discovered as they were by chance, were never definitely entered on maps or



FIG. 22—Abraham Ortelius's map of Japan of 1595. It shows the three main islands with "Meaco" (Kyoto) at approximately the correct place but greatly underestimates the northern extension of Japan's main island

charts, was owing to the uncertainty which there was, even in the eighteenth century, in deciding the geographical co-ordinates of an island lying out of sight of any known land. It was therefore almost impossible when making the definite maps, or what was called the "Padron general" of the map of the world, to register such isolated observations. After having placed those islands discovered by chance sometimes in one spot sometimes in another, so as to make the last sailing reports agree with the statements of previous mariners, the difficulty was finally solved by excluding from the map almost all the newly discovered islands that were far out in the Pacific. The chart of this ocean therefore became almost as blank and devoid of names as the map of the interior of Africa at the commencement of the nineteenth century.

Many Pacific islands were rediscovered and named in the second half of the eighteenth century, during the voyages of exploration made by Byron, Carteret, Wallis, Bougainville, and Cook. After Captain Cook's three great voyages (1768/80) there were no major white spots left on the Pacific map; and when, on January 18, 1778, Cook sighted the Hawaiian Islands, all features of the Pacific, with a few minor exceptions, had become known.

THE MEN BEHIND THE MAPS

At the end of this article we give a list of some maps and globes which are of particular interest from the point of view of Pacific cartography. The reader who lets his eyes wander over those columns will find names of many nationalities represented. Until 1506, with a few notable exceptions such as Martin Behaim, men from Italy and from the Iberian Peninsula were leading in the field of mapmaking. In 1507, with the appearance of Waldseemüller's work, the center of gravity shifted north of the Alps. Against relatively few names of cosmographers in southern Europe stands the long list of outstanding cartographers in the north, at first chiefly in Germany. Waldseemüller in Freiburg and St. Dié, Schöner in Nuremberg, Apianus—father and son—in Ingolstadt, Frisius in Strassburg, Münster in Heidelberg and Basel, Gryneus in Basel, the Frenchman Finæus in Paris, and many others: these became the authorities on geography. While the explorers of southern Europe bravely went out into the world in their frail ships, gathering material and drawing crude section maps of their discoveries, the scientists in the north collected all this information and pondered over it in their learned studies. They were not satisfied with registering a discovery here or there: they tried to com-

bine them into new conceptions of the world as a whole. As men who were not involved in the rivalries of Spain and Portugal, they had no call to keep their ideas secret. With their primitive printing establishments they produced maps and globes of our earth which influenced the thinking of many generations and in turn inspired the explorers to new adventures. Not all of their thinking brought these cosmographers closer to reality—we have only to remember Schöner's Amerasian conception. Yet their maps were momentous landmarks in the evolution of the Pacific map, results of great erudition and bold—sometimes too bold—reasoning.

In the second half of the sixteenth century the center of gravity in cartography once more seemed to shift southward, in the days when Agnese and Gastaldo labored in Venice and the Homem family in Lisbon. But after 1570 it stayed for good in the north. By now two nations from northern Europe, the English and the Dutch, were also venturing out on the high seas; and while the English produced relatively little in the way of mapmaking, the Netherlands became its new center. The Dutch and the Flemish obtained their scientific inspiration from southern Germany. Mercator was a pupil of Apianus, and the Ortelius (Örtel) family came from Augsburg. But the Netherlands did something entirely new—they turned mapmaking into business on a big scale. In 1570 Ortelius published in Antwerp the first atlas with seventy maps, outdistancing anything done before in this field. The demand for this epochal work, which broke Ptolemy's hold for good, was so great that in forty-two years it went into at least forty-one editions in seven languages. As new material accumulated, so-called *Addidamenta* were issued. (The *Addidamentum IV* included, for example, the Pacific map of 1589, Fig. 3.) In 1595 a similar work with a hundred and seven maps was issued by Mercator, father and son, who for the first time employed the name "atlas" after a mythological figure of the Greeks. A whole dynasty of mapmakers evolved. To it belong Jodocus Hondius (brother-in-law of Mercator Jr.); his two sons; one grandson; and one son-in-law, Jan Jansson; with the latter's two sons-in-law. Closely linked with it—sometimes in friendship and sometimes in competition—were W. J. Blaeu with his sons and grandson as well as De Wit and Visscher. But nothing lasts forever. By their very ef-

iciency the Dutch cartographers eventually choked their market, and people were ready for something new. The center of map-making shifted to France, at that time at the height of her European career. The three brothers Delisle had much to do with this shift as well as Sanson with his grandson Vaugondy, D'Anville, and the two Buaches. Finally, to use the words of the *Encyclopaedia Britannica*, "Germany since the middle of the 19th century has become the headquarters of scientific cartography."

Apart from the nations mentioned, representatives of various other countries participated in the work of cartography, for example, Russians and Scandinavians with regard to the northern Pacific. And while some nations have been leading, we can readily say that the evolution of the Pacific map from nonexistence in the fifteenth century to near perfection by the end of the eighteenth century, has been the fruit of the collective efforts of the whole of Europe in the field of exploration and thought.

Landmarks in the History of the Pacific Map

List of some maps or globes, 1507-1783, which are of particular interest in the study of the history of the Pacific map. The real names of those map-makers who have become known under the latinized version of their names are added in parenthesis. No account has been taken of the many controversies regarding dates and makers' names of many of these maps, the most generally accepted dates and names being given. "w.m." stands for world map, "hem." for hemisphere, "rect." for rectangular.

- 1-3. 1507—Martin Waldseemüller, rect. w.m.; 2 hem.; gores
4. 1508—Johann Ruysch, w.m.
5. 1508—so-called Lenox globe
6. 1510—Glareanus (Heinrich von Mollis), oval w.m.
7. 1512—Johann Stöcklin, 2 hem.
8. 1514—Louis Boulenger, gores
9. 1515—Gregorius Reisch, rect. w.m.
10. 1515—Johannes Schöner, globe
11. 1515—so-called Green globe
12. 1519—so-called Leonardo da Vinci globe
13. 1520—Peter Apianus (Blenewitz), heart-shaped w.m.
14. 1520—Johannes Schöner, globe
15. 1520—so-called Liechtenstein gores
16. 1522—Laurent Frisius (Friess), rect. w.m.
17. 1523—Giovanni Vesputi, 2 hem.
18. 1524—Johannes Schöner, gores
19. 1525—Antonio Pigafetta, Strait of Magellan
20. 1527—Vesconte de Maiollo, rect. w.m.
21. 1527—Franciscus Monachus, 2 hem.
22. 1527—so-called Thorne map, rect. w.m.
23. 1528—Benedetto Bordone, oval w.m.
24. 1528—Pietro Coppo, oval w.m.
25. 1529—Diego Ribero, rect. w.m.
26. 1529—Hieronymo da Verrazano, rect. w.m.
27. 1530—Peter Apianus (Blenewitz), heart-shaped w.m.
28. 1530—Robertus de Bailly, gores
29. 1531—Finæus (Oronce Finé), double heart-shaped w.m.
30. 1532—Simon Gryneus, oval w.m.
31. 1534—Peter Martyr, America
32. 1534—Vadianus (Joachim von Warte), oval w.m.
33. 1536—Finæus (Oronce Finé), heart-shaped w.m.
34. 1538—Gerhard Mercator (Kremer), double heart-shaped w.m.
35. 36. 1540—Sebastian Münster, oval w.m., America
37. 1540—so-called Munich gores
38. 1541—Domingo del Castillo, Mexico and California
39. 1542—Battista Agnese, America and Pacific
40. 1542—Houter (Johannes Grass), heart-shaped w.m.
41. 1542—Rotz (Jean Roze), 2 hem.
42. 1542—Alonso de Santa Cruz, 2 hem.
43. 1543—Kaspar Vopel, rect. w.m.
44. 1544—Battista Agnese, oval w.m.
45. 1544—Sebastian Cabot, oval w.m.
46. 1546—Pierre Desceliers, rect. w.m.
47. 1546—Jacopo Gastaldo, oval w.m.
48. 1548—Jacopo Gastaldo, rect. w.m.
49. 1550—Antonius Florianus, gores
50. 1550—so-called Nancy globe
51. 1551—Gemma Frisius (Ragner), heart-shaped w.m.
52. 1552—Franciscus Demonguet, gores
53. 1554—Michael Tramezini, Pacific hem.
54. 1556—Jacopo Gastaldo, American hem.
55. 1556—Kaspar Vopel, heart-shaped w.m.
56. 57. 1558—Diego Homem, southeastern Asia, America
- 57a. 1561—Jacopo Gastaldo, southeastern Asia
58. 1561—Girolamo Ruscelli, 2 hem.
59. 1563—Callapoda (Georgio Sideri), America
60. 1565—Fernando Bertell, southeastern Asia
61. 1566—Bolognito Zaltieri, North America and northeastern Asia
62. 1569—Gerhard Mercator, rect. w.m.
63. 1570—Franciscus Bassus, Amerasia
- 64-67. 1570—Abraham Ortelius (Ortel), oval w.m.; Asia; northeastern Asia; southeastern Asia
68. 1571—Benedikt Arias Montanus, 2 hem.
69. 1572—Joan Martines, 2 hem.
70. 1572—Thomaso Porcacchi, oval w.m.
71. 1574—Aloysius Cesaris, rect. w.m.
72. 1575—André Thevet, America
73. 1576—Sir Humphrey Gilbert, heart-shaped w.m.
74. 1578—George Best, oval w.m.
75. 1582—Fernan Vaz Dourado, southeastern Asia
76. 1581—Medallion of Drake's voyage, 2 hem.
77. 1582—De la Popellinière, oval w.m.
78. 1582—Michael Lok, North America
79. 1587—Richard Hakluyt, America and Pacific
80. 1587—Rumold Mercator (Kremer), 2 hem.
81. 1588—so-called Cavendish map, eastern Pacific
82. 1589—Giovanni Battista Mazza, America
83. 1589—Abraham Ortelius (Ortel), Pacific
84. 1590—Joannes Myritius, oval w.m.
85. 1592—Peter Plancius, 2 hem.
86. 1593—Judaëus (Cornelius de Jode), 2 hem.
87. 1594—Peter Plancius, 2 hem.
88. 1595—Jodocus Hondius, 2 hem.
89. 1595—Abraham Ortelius (Ortel), Japan
90. 1597—Cornelius Wyttliet, Anian
91. 1599—Evert Gysbertsz, southeastern Asia
- 92a. 1599—Richard Hakluyt, rect. w.m.
- 92b. 1599—Jan Huyghen van Linschoten, southeastern Asia
- 93a. 1601—Antonio de Herrera, America and Pacific
- 93b. 1603—Gulielmus Nicolai Belga, gores
94. 1606—Willem Janszoon Blaeu, rect. w.m.
95. 1607—Jodocus Hondius, America
96. 1608—Quadus (Matthæus Quad), rect. w.m.
97. 1611—Jodocus Hondius, 2 hem.
98. 1621—Jan Janssonius (Jansson), globa
99. 1624—Abraham Goos, North America
100. 1625—Henry Briggs, North America
101. 1630—Philip Eckerbrecht, 2 hem.
102. 1630—Henricus Hondius, 2 hem.
103. 1630—Joannes de Laet, America
104. 1630—João Teixeira, rect. w.m.
- 104a. 1639—Nicolaus J. Visscher, 2 hem.
105. 1640—Franciscus Hooius, rect. w.m.
106. 1641—Antonio Sanchez, Pacific

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|---------------------------------------------------------------------|-------------------------------------------------------------|
| 107. 1642—J. A. Colom, southeastern Asia | 124. 1719—Chatelaine, rect. w.m. |
| 108. 1648—Jan Blaeu, 2 hem. | 125. 1722—Guillaume Delsle, America |
| 109. 1650—Isaac de Graaf, North Pacific | 126. 1723—Guillaume Delsle, Asia |
| 110, 111. 1650—Jan Janssonius (Jansson), southeastern Asia, Pacific | 127. 1724—Guillaume Delsle, 2 hem. |
| 112. 1652—Nicolas Sanson, Asia | 128. 1730—Philipp Johann von Strahlenberg, North Asia |
| 113. 1657—Nicolaus J. Visscher, 2 hem. | 129. 1731—Joseph Nicolas Delsle, North Pacific |
| 114. 1660—Hendrick Doneker, Australasia | 130. 1734—Ivan Kyrilov, Russia |
| 115. 1660—Frederick de Wit, 2 hem. | 131. 1735—Jacques Nicolas Bellin, northeastern Asia |
| 116. 1666—Pieter Goos, California | 132. 1750—Joseph Nicolas Delsle, North Pacific |
| 117. 1666—Melchisédech Thévenot, Australia | 133. 1750—Laurent, Kuril Islands |
| 118. 1675—Frederick de Wit, Pacific | 134. 1752—Philippe Buache, North Pacific |
| 119. 1692—Nikolaus Witsen, North Asia | 135. 1752—Joseph Nicolas Delsle, North Pacific |
| 120. 1696—Jean Baptiste Nolin, round w.m. | 136. 1758—St. Petersburg Academy of Sciences, North Pacific |
| 121. 1700—Guillaume Delsle, North America | 137. 1761—Jean Baptiste Bourguignon d'Anville, Western hem. |
| 122. 1700—Edmund Halley, rect. w.m. | 138. 1762—Janvier, North America |
| 123. 1710—Jean C. Mortier, rect. w.m. | 138a. 1766—Callander, Australasia |
| 123a. 1717—Jesuit Atlas, China | 139. 1775—Jean Nicolas Buache, North Pacific |
| | 140. 1783—Robert de Vaugondy, North America |

Radio and Madness

Dr. O. E. Pfister, a Swiss psychiatrist, has been studying the effect of radio broadcasts on the insane. Paranoiac schizophrenes, he has found, are attracted by the incorporeal, invisible transmission of voices by the radio; they often use expressions taken from the radio: they speak of "built-in microphones" which transmit their thoughts, of "radio thought interference," "loudspeakers in the head," etc. Broadcasting studios frequently receive letters demanding high indemnities for alleged insults or persecution. Even physical damage is sometimes ascribed to the radio. Then there are the paranoiac prophets and world saviors, who seem to have a special predilection for the radio. They all want to use the microphone to proclaim their more or less religious prophecies and plans for improving the world. Another type of—usually female—paranoiac keeps on writing to the studios about the marriage proposals or love declarations made to them over the radio by speakers or singers.

Many of the letters received by the studios reveal serious mental deficiencies in persons living outside of asylums. It appears that these insane reveal their hallucinations to the radio before the people of their surroundings have become aware of them. Dr. Pfister suggests that psychiatrists, when examining patients, ask them what they think of the radio, since an informal conversation on this subject may easily uncover paranoiac symptoms in the patient.

Man at Work

In a Chicago court Robert M. Hoffman Jr. said his business partner had operated branch offices in New York, Philadelphia, Boston and San Francisco chiefly in the hope of finding a pretty stenographer to marry.

Ticklish

In Frankfort, Ky., a divorce was awarded to Charles R. Barnett, who charged that his wife had refused to kiss him because his mustache tickled.

Gratitude

In Cedar Grove, N.J., Private Dominic Donadio gave his newborn son a middle name: Furlough.